

MILITARY ROUTE CLASSIFICATION SYSTEM

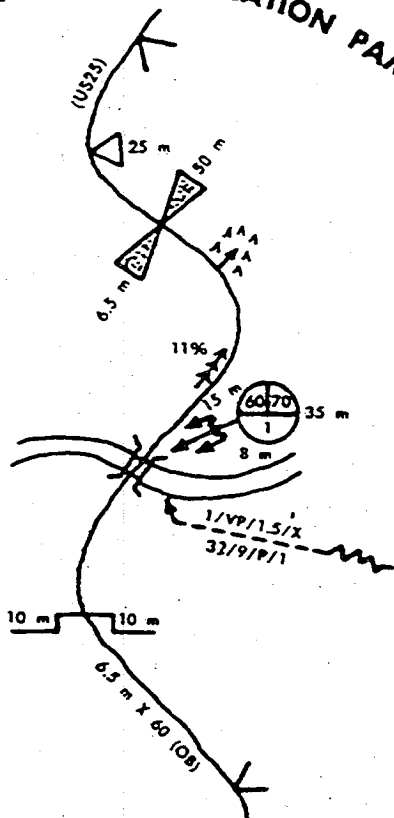
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PIONEERING FOR ARMOR

VEHICLE AND ROUTE CLASSIFICATION PAMPHLET



US ARMY ARMOR SCHOOL
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VEHICLE AND ROUTE CLASSIFICATION*

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* This pamphlet supersedes USAARMS Bridge, Vehicle, and Route Classification Card.

Section I. VEHICLE CLASSIFICATION SYSTEM

1. GENERAL

All vehicles with a gross weight over 3 tons and all trailers with rated payload over 1½ tons are assigned classification numbers. These numbers indicate a relationship between the load carrying capacity of a bridge and the effect produced on it by a vehicle. The effect of the vehicle on the bridge depends on (1) the gross weight of the vehicle, (2) the weight distribution to the axles, and (3) the speed at which the vehicle crosses the bridge.

2. SINGLE VEHICLE CLASSIFICATION

- a. Use vehicle classification appendix D, FM 5-36.
- b. Expedient method: Wheel = .85 times gross weight in tons.
Track = gross weight in tons.

Note. Vehicle weights may be found in the TM of the vehicle or on the vehicle data plate.

3. COMBINATION VEHICLE CLASSIFICATION

- a. Standard combinations—vehicle classification listed in appendix D, FM 5-36.
- b. Nonstandard combinations (vehicles closer than 30 meters.) If the sum of the vehicles' classifications is 60 or less, the combination class is 0.9 times the sum; if the sum is greater than 60, the total sum represents the class of the combination.

4. VEHICLE CLASSIFICATION SIGNS

- a. Classification numbers assigned to vehicles are whole numbers ranging from 4 through 150. Front signs on a vehicle are 9 inches in diameter and the side signs are 6 inches in diameter. The signs have black numerals on a yellow background, and the numerals are as large as the sign will permit. Place the front sign above the bumper to the driver's right and below his line of vision, and the side sign on the right side of the vehicle in a place where normal use of the vehicle does not conceal it from view.
- b. Combination classification: With a combination vehicle (2 or more single vehicles spaced less than 30 meters apart), the front sign shows the normal vehicle class for the combination with the letter C in red above the class number. Each vehicle in the combination carries a side sign which shows its class as a single vehicle.

5. LOAD CLASSIFICATION FOR STANDARD VEHICLES

a. Track Vehicles.

Nomenclature	Class with normal load
Armored reconnaissance assault vehicle, M551	16
Bulldozer, earthmoving, M9 (tank, combat, M60)	52
Carrier, command post, light track, M577	11
Carrier, personnel, full track, armored M113	11
Carrier, command and reconnaissance, armored, M114A1 ..	7
Howitzer, heavy, self-propelled, full-track, 8-inch, M110 ..	27
Howitzer, light, self-propelled, full-track, 105-mm, M108 ..	22
Howitzer, medium, self-propelled, full-track, 155-mm, M109, M109A1	24/26
Launcher, M60A1 chassis, transporting with bridge armored vehicle launched, scissoring type, class 60	57
Mortar, infantry, self-propelled, full track, 107-mm, M106 ..	15
Recovery vehicle, full-track, medium, M88	55
Recovery vehicle, full-track, light	25
Tank, combat, full-track, medium, 90-mm gun, M48	42
M48A1	52
M48A3	51
Tank, combat, full-track, 105-mm gun, M60, M60A1	50
Vehicle, combat engineer, full-track, M728	57

b. Wheel Vehicles.

Shop equipment, organizational repair, set no. 2	10
Truck, cargo $\frac{3}{4}$ -ton, 4x4, M37, M37B1	4
Truck, cargo, $2\frac{1}{2}$ -ton, 6x6, M35	8
Truck, cargo, 5-ton, 6x6, M55, M55A2	16
Truck, tank, fuel servicing, 2,500 gal, 4x4, XM559E1 (GOER)	22
Truck, tractor, wrecker, 5-ton, 6x6, M246	20

c. Miscellaneous.

Gun, field artillery, SP, 175-mm, M107	29
Gun, antiaircraft artillery, SP, 20-mm, M741 (Vulcan),	12
Gun, field artillery, towed, 155-mm, M59	14
Howitzer, light, towed, 105-mm, M102	2
Howitzer, medium, towed, 155-mm, M114, M114A1	9
Semitrailer, tank transporter, 50-ton, 8 wheel, M15A2	78
Trailer, ammunition, 8-ton, 4 wheel, M23	11
Trailer, cargo, $1\frac{1}{2}$ -ton, 2 wheel, M104, M104A1, M104A2 ..	4

Section II. BRIDGE CLASSIFICATION SYSTEM

6. BRIDGE CLASSIFICATION SIGNS

- a. The class number of a bridge represents the safe load-carrying capacity of a single-lane bridge, or a single lane of a multilane bridge under normal crossing conditions. The bridge class number may be a single class number, which will permit either a wheel or track vehicle to cross if the vehicle class number is equal to or less than the bridge class number.
- b. All single-lane bridge signs are a minimum of 16 inches in diameter. For multilane and dual class bridges, the signs are at least 20 inches in diameter. Numerals are black on a yellow background, with a black border $1\frac{1}{2}$ inches wide.
- c. A multilane bridge has a roadway wide enough to carry at least two lanes of traffic simultaneously. If each lane has the same class, the signs are the same as for single-lane bridges. If the lanes are of different classes, each lane has a class sign. Two-lane bridges may carry a combination circular sign (fig 1), which gives the normal two-way classification on the left and the computed, one-way classification on the right.
- d. Dual classification is used for bridges with a capacity greater than class 30. Two numbers are then shown on the sign: the upper one for wheel vehicles, the lower one for track vehicles (fig 1). Dual class two-lane bridges may be designated by a composite sign indicating both dual class and combination classes (fig 1).

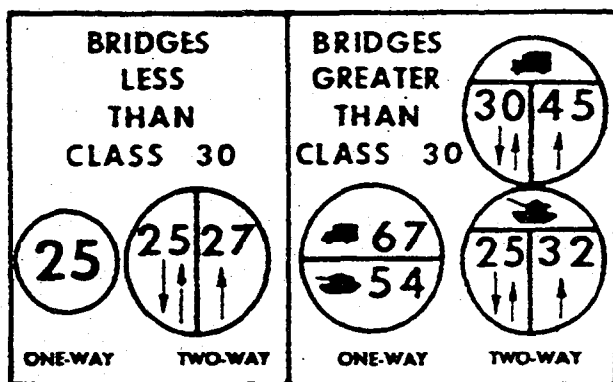


Figure 1. Bridge classification signs.

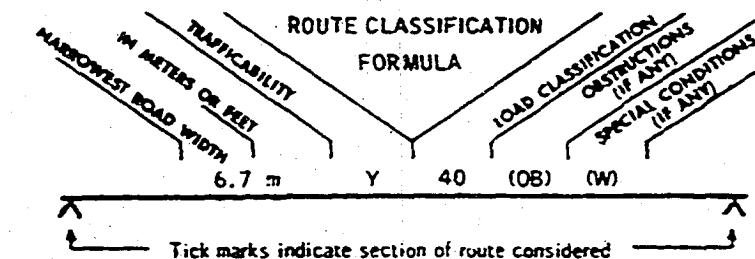
7. TYPES OF CROSSINGS



- a. **Normal Crossing.** Normal convoy discipline must be imposed on vehicles making a normal crossing. A minimum spacing of 30.5 meters between vehicles and a maximum speed of 40 kmph (25 mph).
- b. **Caution Crossing.** Caution crossings of nonstandard bridges are made by exceeding the normal classification by 25 percent. To determine the caution classification, multiply the normal one-lane crossing by 1.25. Caution crossings may be authorized by the local tactical commander (senior officer or NCO) only in exceptional cases. When executing a caution crossing, the operator must maintain a constant speed of 12 kmph (8 mph) or less. He will operate the vehicle on the center of the bridge and will not turn, shift, accelerate, or stop. Always maintain an interval of at least 50 meters between vehicles.
- c. **Risk Crossing.** A risk crossing may be made only on standard prefabricated fixed and floating bridges. Risk crossings are made only in the greatest emergencies. The vehicle moves on the centerline, does not exceed 5 kmph (3 mph), is the only vehicle on the bridge, does not stop, is not accelerated, and does not shift gears on the bridge. The vehicle class number must not exceed the published risk class. After the crossing, and before other traffic is permitted, the engineer officer should reinspect the entire bridge.

Section III. ROUTE CLASSIFICATION SYSTEM

8. ROUTE CLASSIFICATION FORMULA

The route classification formula is placed adjacent to trace of route, and indicates the overall capability of the route section considered.



		
↑	6-8 m (19½-26 ft)	5.5-7 m (18-23 ft)
↓	over 8 m (26 ft)	over 7 m (23 ft)

LOAD CLASSIFICATION

The weakest member of the route is used as a class and is normally the lowest class bridge on the route, however, in some cases, the road surface can limit classifications.

OBSTRUCTIONS

The symbol (OB) is used if one or more of the following conditions exist:

- (1) Overhead clearance less than 4.3 m (14 ft).
- (2) Road width less than required.
- (3) Grades of 7% or more.
- (4) Radius of curve less than 30 m (100 ft).
- (5) Ferries or fords.
- (6) Other unusual conditions.

TRAFFICABILITY

X—All-weather route usable year-round with reasonable maintenance; closed only by special conditions. Route surface characterized by concrete, blacktop, or other waterproof material.

Y—Limited all-weather route with reasonable maintenance but has limited capacity in bad weather; may be closed for short periods. Heavy unrestricted use during adverse weather may cause deterioration of the surface. Route surface characterized by macadam, bituminous surface treatment, gravel, or other water-resistant surface.

Z—Fair weather route seriously affected by adverse weather; may be impassable for long periods. This route surface is characterized by dirt, sand-clay, or other unprotected surfaces.

SPECIAL CONDITIONS

(T) Used when snow blockage is expected.

(W) Used when flooding is expected.

9. ROUTE RECONNAISSANCE OVERLAY

The route reconnaissance overlay is an accurate and concise report of conditions affecting traffic flow along a specified route, and is the preferred method of preparing a route reconnaissance report. If more detail is required to support the reconnaissance, then the overlay is supplemented with written reports describing the critical route characteristics in more detail.

Example of an overlay pertaining to a route from UT83430500 to UT87570508

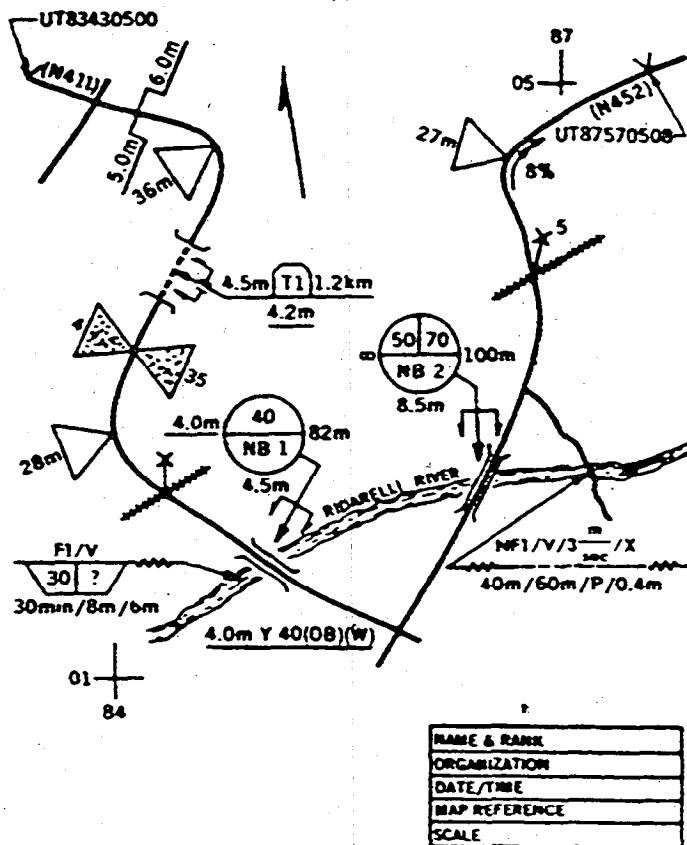


Figure 2. Example of overlay graphics.

10. SYMBOLS FOR USE IN THE RECONNAISSANCE OVERLAY


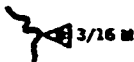
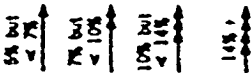


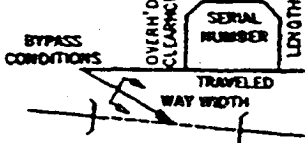



SYMBOL	DESCRIPTION & CRITERIA
	SHARP CURVE: (OB) Any radius less than or equal to 30 meters, however, any curve greater than 30 meters, but less than 45 meters is reportable.
	SERIES OF SHARP CURVES: The figure to the left indicates the number of curves; that to the right, the minimum radius of curvature in meters.
	STEEP GRADES: (OB) Any grade 7% or higher. Actual % of grade will be shown. Arrows always point uphill, and length of arrow represents length of grade if map scale permits.
	CONSTRICTION: (OB) Any reduction in the traveled way below the standards on page 5. The figure to the left indicates the width of the constriction; that to the right, the total constricted length, both in meters.
	UNDERPASSES: Show shape of structure (OB) when overhead clearance is less than 4.3 m or when the traveled way is below the standards on page 5.
	TUNNEL: (Includes man-made snowsheds.) Show shape of structure (OB) when overhead clearance is less than 4.3 m or when the traveled way is below the standards on page 5.
	RAILROAD (RR) LEVEL GRADE CROSSING: Passing trains will interrupt traffic flow. The figure indicates overhead clearance.
	LIMITS OF SECTOR: Limits of reconnoitered sector or of route having the same road classification formula.
	ROUTE DESIGNATION: Civil or Military Route Designation. Written in parentheses along route.

Figure 3(1). Overlay symbols.

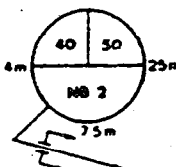
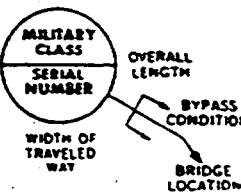
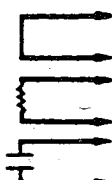
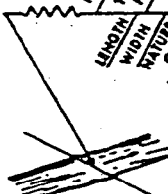
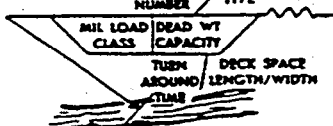
SYMBOL	DESCRIPTION & CRITERIA
	
	<p>BYPASSES: Are local alternate routes which enable traffic to avoid an obstruction. Bypasses are classified as EASY, DIFFICULT, or IMPOSSIBLE. Each type bypass is represented symbolically on the line extending from the symbol to the map legend and defined as follows:</p> <p>BYPASS EASY: The obstacle can be crossed within the immediate vicinity by a US 2.5 ton truck (or NATO equivalent) without work to improve the bypass.</p> <p>BYPASS DIFFICULT: The obstacle can be crossed within the immediate vicinity, but some work will be necessary to prepare the bypass.</p> <p>BYPASS IMPOSSIBLE: The obstacle can only be crossed by one of the following methods:</p> <ol style="list-style-type: none"> (1) Repair of river, i.e., bridge (2) New construction (3) Denser using an alternate route which crosses the obstacle some distance away.
	<p>FORD: All fords are considered as obstructions (OB) to traffic.</p> <p>Type of Ford: V—Vehicular P—Pedestrian</p> <p>Seasonal Limiting Factors: X—No seasonal limitation except for limited duration sudden flooding. Y—Significant seasonal limitations.</p> <p>Approach Conditions: ~~~~~ Difficult Easy</p> <p>Nature of Bottom: M—Mud C—Clay S—Sand G—Gravel B—Bedrock P—Artificial Paving</p>
	<p>FERRY: All ferries are considered as obstructions (OB) to traffic.</p> <p>Approach Conditions: ~~~~~ Difficult Easy</p> <p>Type of Ferry: V—Vehicular P—Pedestrian</p>

Figure 3(2). Overlay symbols.

Section IV. FORD RECONNAISSANCE

FORDREP			
Explanation	Letter designation	(1) ¹	(2) ²
Map sheet(s)	ALFA		
Date and time information was collected	BRAVO		
Location (UTM grid coordinates and ford type)	CHARLIE		
Minimum width	DELTA		
Maximum depth	ECHO		
Stream velocity	FOXTROT		
Type of bottom	GOLF		
Maximum percent of slope on bank exits and entrances	HOTEL		
Military load classification	INDIA		
Other information	JULIETT		

Notes. ¹ First ford in report; report by serial number if assigned.

² Additional fords in report.

Figure 4. Ford report format

Type of traffic	Shallow fordable depth (meters)	Minimum width (meters)	Maximum percent of slope for approaches
Foot	1 (39 in)	1 (39 in) (single file) 2 (79 in). (column of 3's)	100%
Trucks and truck-drawn artillery	.75 (30 in)	3.6 (12 ft)	33%
Light tank	1 (39 in)	4.2 (14 ft)	50%
Medium tanks ²	1.05 (42 in)	4.2 (14 ft)	50%

Notes. ¹ Based on hard, dry surface.

² Depths up to 4.3 meters can be negotiated with deep water fording kit.

Table 1. Trafficability of fords.

Section V. BRIDGE RECONNAISSANCE

Bridge classification is based on the class of the superstructure only, since this is considered to be the controlling feature. However, the condition of both superstructure and substructure components should be examined closely for damage or deterioration and the probable effect on the bridge capacity. Conduct a bridge reconnaissance to obtain and report the following information on the existing bridge:

Explanation		
Bridge location (coordinates)	.....	ALFA
Condition of bridge	.....	BRAVO
Type stringer and size	.....	CHARLIE
Total number of stringers	.....	DELTA
Number of lateral braces	.....	ECHO
Span length (L) (ft)	.....	FOXTROT
Roadway width (ft)	.....	GOLF
Vertical clearances	.....	HOTEL
Type decking and size (in)	.....	INDIA
Note. Treadway or wearing surface should not be included in deck thickness measurement.		

STEEL STRINGERS/TIMBER STRINGERS

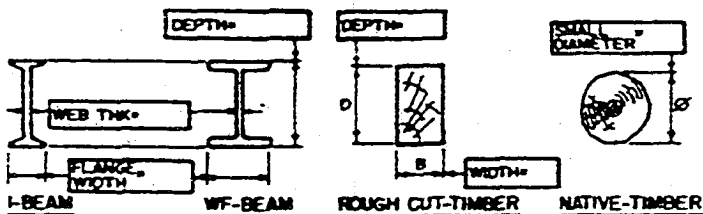


Figure 5. Bridge report format.

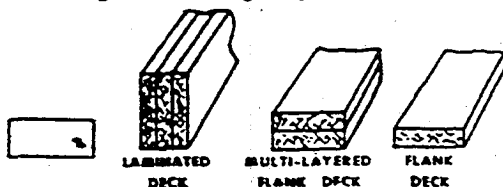


Figure 6. Stringers and decking.

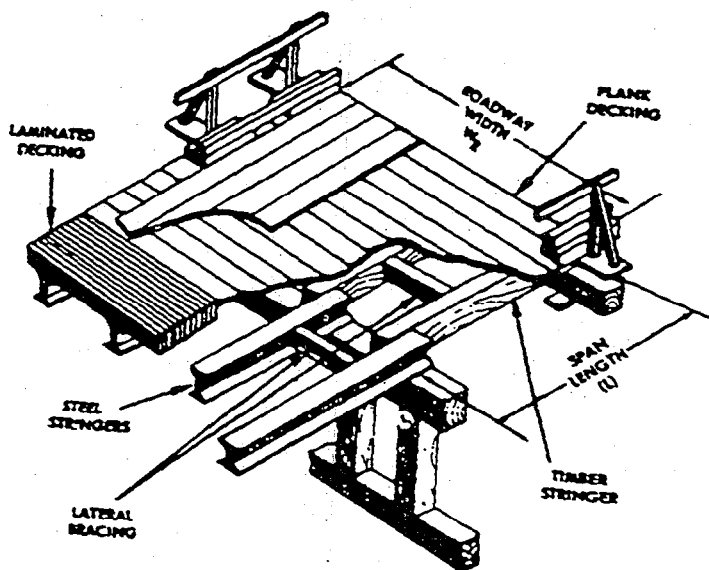
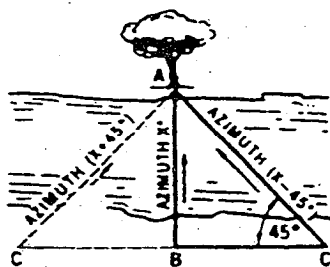


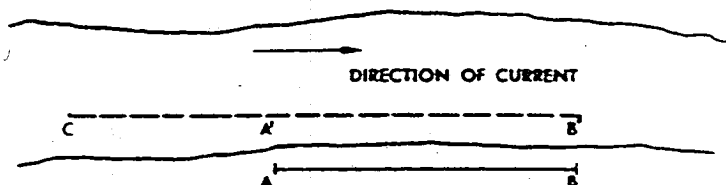
Figure 7 Stringer bridge nomenclature.

Section VI. EXPEDIENT FORMULAS



1. Select prominent object A (i.e., tree) on far bank.
2. Stand at point B, opposite A, and read azimuth X°
3. Move up or down stream to a point C so that azimuth to A equals $X+45^\circ$ or $X-45^\circ$
4. Distance BC then equals gap AB

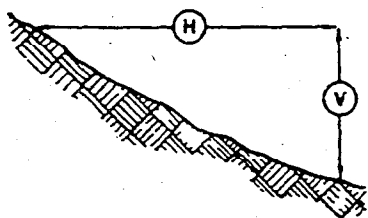
Figure 8. Measuring approximate stream width using compass.



1. Distance AB is measured.
2. Floating object is thrown into stream at C.
3. Time required for floating object to float distance A'B' is determined.

$$V = \frac{AB \text{ (meters or feet)}}{\text{Time to float from A' to B' (sec)}}$$

Figure 9. Method of determining stream velocity.

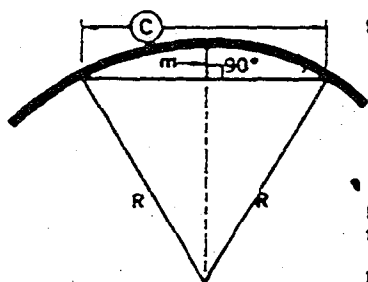


1. When using any distance for (H), use the formula

$$\% \text{ Slope} = \frac{V}{H} \times 100$$

2. By always setting the horizontal (H) at 50, and measuring the vertical distance (V), the formula becomes $\% \text{ slope} = 2 \times V$.

Figure 10. Determining percent (%) of slope.



$$R = \frac{c^2}{8m} + \frac{m}{2}$$

c = length of chord (tape)

m = perpendicular distance from the center of tape to the \odot of road

- 1 R = radius of circle

By fixing m always at 2 meters, then the formula becomes —

$$R = \frac{c^2}{16} + 1$$

Figure 11. Measuring the radius of a curve.

$$W_T = \frac{(A_T) (P_T) (N_T)}{2000}$$

W_T = Grossweight of wheel vehicle in tons

A_T = Average tire contact area in square inches

P_T = Tire pressure in psi

N_T = Number of tires

Note. Tire pressure may be assumed to be 75 psi if no tire gauge is available.

Figure 12. Gross weight of wheel and track vehicles in tons.

11. ESTIMATION OF GROSS WEIGHT

Track vehicles can be assumed to be designed for approximately 2,000 pounds (1 ton) per square foot of their bearing area. Therefore, the gross weight of track vehicles can be estimated by measuring the total ground contact area of the tracks in square feet and equating this to the gross weight in tons.